Note on the Magnitude of η Argûs, 1896. By R. T. A. Innes.

(*Communicated by Dr. Gill, H.M. Astronomer.*)

Four determinations of the brightness of this star were made here in 1896, viz.—

	Mag.
Apr. 26	7·6
May 17	7·5
June 28	7·6 orange yellow
July 13	7·6
Means 1896·43	7·58

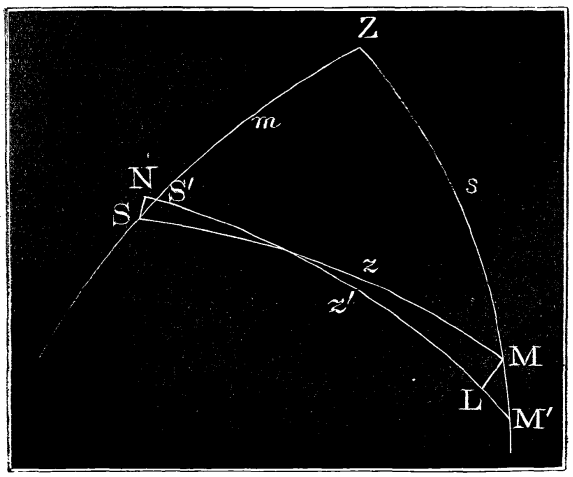
The telescope used was the 7-inch equatorial, and the comparison stars and magnitudes are those given for that purpose in the *Uranometria Argentina.*

The magnitude of η *Argûs* was also determined here in 1886 March (see *M.N. R.A.S.* vol. xlvi. page 340) by Mr. W. H. Finlay, on which occasion it was found to be 7·6 mag., the same comparison stars being used.

Royal Observatory, Cape of Good Hope:
1896 *December* 16.

A Method of Clearing a Lunar Distance. By F. C. Penrose.

Various methods have been proposed for facilitating the operation in nautical astronomy of clearing the lunar distance. One was brought before the Society in 1884 by Mr. John Merrifield, which is printed in the *Monthly Notices* for April of that year. The plan I here venture to propose has thus much in common with that above mentioned, viz. that it deals chiefly with the small triangles which result from parallax and refraction, but it is dissimilar in all other respects.



The advantage looked for is that, whilst all desirable accuracy is obtained, it can be worked with logarithms restricted to four places, and thereby lightens the labour of calculation, and to some degree also the chance of errors in computation.

Let Z be the zenith, M′ and S′ the apparent, and M and S the true places of the Moon and Sun or star, and z' and z the apparent and true distance respectively, and let the sides of the small triangles about M and S be named—MM′, δs, M′L δz and SS′ and SN δm and $\delta z_{,,}$ respectively. It can easily be shown that when these triangles are very small *

$$\delta z = \delta s \left(\frac{\cos m \,.\, \sin s - \sin m \,.\, \cos s \,.\, \cos Z}{\sin z} \right)$$

and the same, *mutatis mutandis*, applies to $\delta z_{,,}$. The triangle connected with S will almost always be small enough, but that at M, when great accuracy is required, will generally need a small correction, but one that is very easily applied.

Taking an example from *Raper's Navigation* (p. 289 of 9th edit.)—

Apparent alt. of ☉ 47° 31′, of ☾ 36° 52′, app. dist. 48° 20′ 29″. Sun's correction 47″, that of ☾ 45′ 35″.

First calculate the angle Z—in this step it is best to use logarithms to five figures—and whilst taking out the logarithms necessary for this step, take out also—to four places—those of the sin and cos of the side s diminished by half the parallax in altitude, and of m increased by $\frac{1}{2}$ 47″.

	° ′ ″		
m'	42 29 0	9·82954	Also 9·8296 and 9·8677 log cos m
s'	53 8 0	9·90311	„ 9·9009 „ 9·7819 „ s
z'	48 20 29	9·73265	
	2)143 57 29		
	71 58 44	9·97815	
	−48 20 29		
	23 38 15	9·60309	
		9·58124	Z = 65° 42′ 45″. Its log cos 9·6142
		−9·73265	
		9·84859	

* Cos z = cos m . cos s + sin m . sin s . cos Z.

In this inquiry Z is always constant, and whilst considering the effects upon s and m separately, the opposed side m or s will be constant.

$$\therefore -\sin z \frac{dz}{ds} = -\cos m \,.\, \sin s + \sin m \,.\, \cos s \,.\, \cos Z,$$

$$\text{and } \therefore dz = ds \left(\frac{\cos m \,.\, \sin s - \sin m \,.\, \cos s \,.\, \cos Z}{\sin z} \right).$$

Then using the formula above given

$$\begin{array}{lrlr}
\text{L} \cos m & 9{\cdot}8677 & \text{L} \sin m & 9{\cdot}8296 \\
\text{L} \sin s & \underline{9{\cdot}9009} & \text{L} \cos s & \underline{9{\cdot}7819} \\
 & +9{\cdot}7686 & & 9{\cdot}6115 \\
 & & \text{L} \cos \text{Z} & \underline{9{\cdot}6142} \\
\text{No. } {\cdot}5869+ & & & 9{\cdot}2257 \quad \text{No. } {\cdot}1682 \text{ negative}
\end{array}$$

Then

$$\begin{array}{lrr}
{\cdot}5869 & & \\
\underline{-{\cdot}1682} & & \\
{\cdot}4187 & \text{Its log} & 9{\cdot}6219 \\
 & -\text{L} \sin z & \underline{9{\cdot}8734} \\
 & & 9{\cdot}7485 \\
 & +\log \sin \delta s & \underline{8{\cdot}1225} \\
 & & 7{\cdot}8710 \quad \text{Log sin } 25' \; 32''{\cdot}6. \quad \text{First approx. of } \delta z.
\end{array}$$

For $dz_{\prime\prime}$ use the same elements, but transposed:

$$\begin{array}{lrlr}
\text{Log} \cos s \,.\, \sin m & 9{\cdot}6115 & \text{Log} \sin s \,.\, \cos m & 9{\cdot}7686 \\
 & & \text{L} \cos \text{Z} & \underline{9{\cdot}6142} \\
\text{No. } & {\cdot}4088 & & 9{\cdot}3828 \quad \text{No. } {\cdot}2414 \text{ negative} \\
 & \underline{-{\cdot}2414} & & \\
 & {\cdot}1674 & \text{Its log} & 9{\cdot}2238 \\
 & & -\text{L} \sin z & \underline{9{\cdot}8734} \\
 & & & 9{\cdot}3504 \\
 & & +\text{Log sin } 47'' & \underline{6{\cdot}3577} \\
 & & & 5{\cdot}7081 \quad \text{Log sin } 0' \; 10''{\cdot}5 = \delta z''
\end{array}$$

Hence the first correction of the distance is

$$25' \; 32''{\cdot}6 - 10''{\cdot}5 = 25' \; 22''{\cdot}1,$$

and the distance becomes $47° \; 55' \; 7''$ as a first approximation. Now reduce the original distance by half the calculated correction, and use the sin of this value in the previous computation of δz; or, what amounts to the same thing, apply to the final term the difference due to this reduced value of log sin z, which in this case (9·8719 instead of 9·8734) amounts to $+{\cdot}0015$, and the final term to 7·8725, making $dz_{\prime} = 25' \; 38''$.

The value of $\delta z_{\prime\prime}$ will not be altered appreciably, so the final correction is $25' \; 27''{\cdot}5$, and the distance $47° \; 55' \; 1''{\cdot}5$.

A complete solution of this example, using logarithms to seven places, gives the distance $47° \; 55' \; 0''{\cdot}88$.

It may be seen by the formula that when the angle Z is less than 90° if the second and negative term is greater than the first, the distance will be increased by the Moon's parallax in altitude, but in extreme cases the solar (or stellar) refraction may modify the general rule.

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Notes on Meteors observed at Penarth, Glamorgan, on 1896, Nov. 14. By George Carslake Thompson, LL.M., and H. W. Lloyd Tanner, M.A., F.R.A.S.

Our attention was mainly directed to the region of *Leo Major*. A building behind us cut off the western sky, some trees cut off the south, and we faced east or north-east. We both watched for about four hours after midnight with an interval specified in the following table. After 4 A.M. the observations were continued till 5.20 A.M. by Mr. Carslake Thompson alone. Each observation was recorded and rough notes were written at the time by G. C. T.

The entries in column A1 refer to meteors from the Sickle in *Leo*; A2, from the region above the Sickle; A3 from the region of β *Leonis* or the region between β and the Sickle. The entries in column B are of meteors from other directions. The directions of the meteors noted in column C were not determined.

	A			B	C	
Time.	1	2	3			Notes.
Soon after midnight	...	...	...	1	...	
12 35	1	...	...	...	...	
12 45	...	...	1	...	...	
12 52	1	...	...	...	...	
12 57	1	...	...	...	...	Short course with fine train; appeared 3 or 4 degrees eastward of Sickle; direction of course, perpendicular to and bisecting the line joining γ and ζ Leonis.
1 11	...	1	...	...	...	
1 30	1	...	...	...	...	Very faint and very short course; appeared very near ζ Leonis; course inclined upwards at perhaps 30° to line joining γ and ζ.
1 34	1	...	...	...	...	
1 37	...	...	...	...	1	
1 47	...	...	1	...	...	
1 54	1	...	...	...	...	Fine train from direction ζ Leonis Maj. towards η or ζ Ursæ Maj.
1 $54\frac{1}{2}$	1	...	...	1	...	In same line; might have been same one coming into the air again.
1 58	...	...	...	...	...	
2 1	1	...	...	...	...	A very fine one; passed very close to ψ and γ Ursæ Maj. (perhaps half a degree above them) in a line parallel to the line joining these stars. Train persisted 2 or 3 seconds.